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Case Report

Foreign-Body Reaction Resulting in Thyroiditis—A Complication of Fine-Needle Aspiration Biopsy of the Thyroid

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Abstract

Fine-needle aspiration biopsy (FNAB) is a cost-effective and safe office procedure performed to evaluate thyroid nodules. We report a case of a 33-year-old woman who presented with pain and swelling of the thyroid after undergoing an FNAB for a right thyroid nodule at an outside hospital. The patient received a course of antibiotics without complete resolution of her symptoms and ultimately, underwent a right thyroid lobectomy. Pathology of the excised thyroid tissue showed chronic lymphohistiocytic inflammation with giant cell reaction and hemorrhage consistent with a foreign-body reaction. The patient's symptoms completely resolved after the surgery. Though uncertain what foreign body was introduced into the thyroid tissue during the FNAB, we surmise that an accidental introduction of ultrasound gel may have caused this rare and unexpected complication of a procedure with usually few and manageable complications.

Key Words: foreign-body reaction, fine-needle aspiration, complication, thyroid

Abbreviation: FNAB, fine-needle aspiration biopsy.

Fine-needle aspiration biopsy (FNAB) is the most sensitive and cost-effective method to assess the nature of thyroid nodules and the need for surgery. American Thyroid Association guidelines recommend FNAB for selected nodules based on size and the presence of suspicious ultrasound features [1]. FNAB is usually performed under ultrasound guidance in the United States and is known to be a safe office procedure that is well tolerated by most patients. Complications that have been reported in the literature are extensively described in a systematic review of 13 studies including 18 156 individuals who underwent thyroid FNAB [2]. The most common complications are local pain or discomfort and minor hematomas, which typically resolve within several days. Rare complications include infection, acute transient thyroid swelling, tracheal puncture, massive hematoma leading to airway compromise, needle-track seeding leading to tumor implantation, and recurrent laryngeal nerve injury leading to vocal cord paralysis [2, 3]. As expected, the skill of the proceduralist and adherence to universal sterile precautions forestall complications in most cases. We report a case of post-FNAB idiopathic foreign-body reaction within the thyroid gland associated with painful thyroiditis.

Case Presentation

A 33-year-old woman presented to an outside hospital for evaluation of a palpable right thyroid mass that she had initially noticed 4 months prior to presentation. She had no symptoms of thyroid dysfunction, airway compromise, or mass effect, and no family history of thyroid disease. Her thyrotropin level at presentation was 1.4 mIU/L (range, 0.4-4.5 mIU/L). Initial thyroid ultrasound showed a $1.7 \times 2.2 \times 1.7$ cm solid hypoechoic nodule with irregular margins in the lower pole of the right thyroid lobe. A computed tomography scan of the neck showed a partially calcified nodule in the right thyroid lobe measuring $2.2 \times 1.8 \times 1.5$ cm. An ultrasound-guided FNAB of the right thyroid nodule was performed at the outside hospital (Fig. 1). The cytopathology was read as a follicular neoplasm (Bethesda category IV) with abundant Hürthle cells and occasional macrophages. Afirma GSC was negative for mutations, consistent with benign findings. Three weeks after the biopsy, the patient presented to the emergency department at our facility with progressive thyroid pain and enlargement associated with mild odynophagia; her symptoms had started immediately after the biopsy procedure. She had no fever or sign of airway compromise.

Diagnostic Assessment and Treatment

On physical examination, her vital signs were within normal limits, her right thyroid lobe was exquisitely tender to palpation, and the rest of her physical examination was unremarkable. A repeat ultrasound showed an increase in the size of the solid hypoechoic irregular nodule in the right thyroid lobe to $3.9 \times 3.4 \times 3.5$ cm and evidence of surrounding edema

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(Fig. 2). A repeat computed tomography scan was also performed and showed a 4.7 × 3.1 × 2.8 cm heterogeneous lesion in the right lobe of the thyroid with suspected hemorrhage within the nodule, mass effect on the trachea, and reactive cervical lymph nodes. Direct laryngoscopy did not reveal any significant findings. It was concluded that she likely had post–thyroid biopsy hemorrhage with superimposed infection/thyroiditis. She was treated with amoxicillin-clavulanic acid 875 mg twice daily for a week and a follow-up was planned. Antibiotic treatment resulted in improvement in thyroid pain and a decrease in thyroid size, but pain and swelling did not fully resolve. At our initial evaluation in the endocrinology clinic 2 months after the FNAB, a right thyroid lobectomy was recommended because of persistent pain, concern for possible persistent infection, and concern that, despite the negative Afirma GSC result, the initial ultrasound findings were suspicious for malignancy and the patient was understandably reluctant to undergo a repeat FNAB. Following right thyroid lobectomy, a pathologic examination of the right thyroid lobe revealed chronic lymphohistiocytic inflammation with giant cell reaction and hemorrhage, suggestive of inflammatory reaction, background follicular hyperplasia with septal fibrosis, and mild chronic thyroiditis (Figs. 3 and 4).

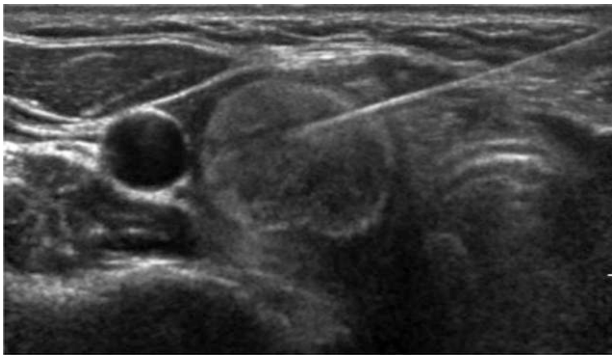

Figure 1. Fine-needle aspiration biopsy ultrasound of a right thyroid nodule performed April 20, 2021.

Outcome and Follow-up

The pathology report showed that a foreign-body reaction had occurred in the patient's right thyroid lobe after the FNAB. The patient remained asymptomatic with normal thyrotropin levels after lobectomy, indicating that the foreign body reaction likely caused her thyroiditis.

Discussion

Foreign-body reaction occurs when material not native to the human body is introduced, resulting in the activation of the body's natural defense mechanisms to wall off the foreign body. Some ways by which foreign bodies can be introduced include through tattooing, self-administered intravenous

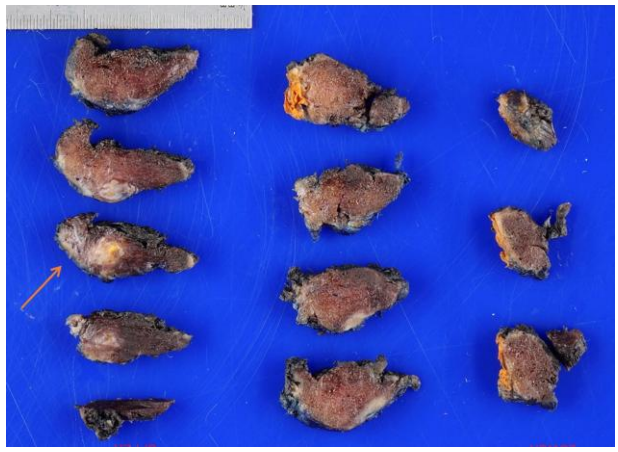

Figure 3. Right thyroid lobectomy, gross specimen with a 0.8-cm solid nodule with irregular borders in the lower pole (red arrow).

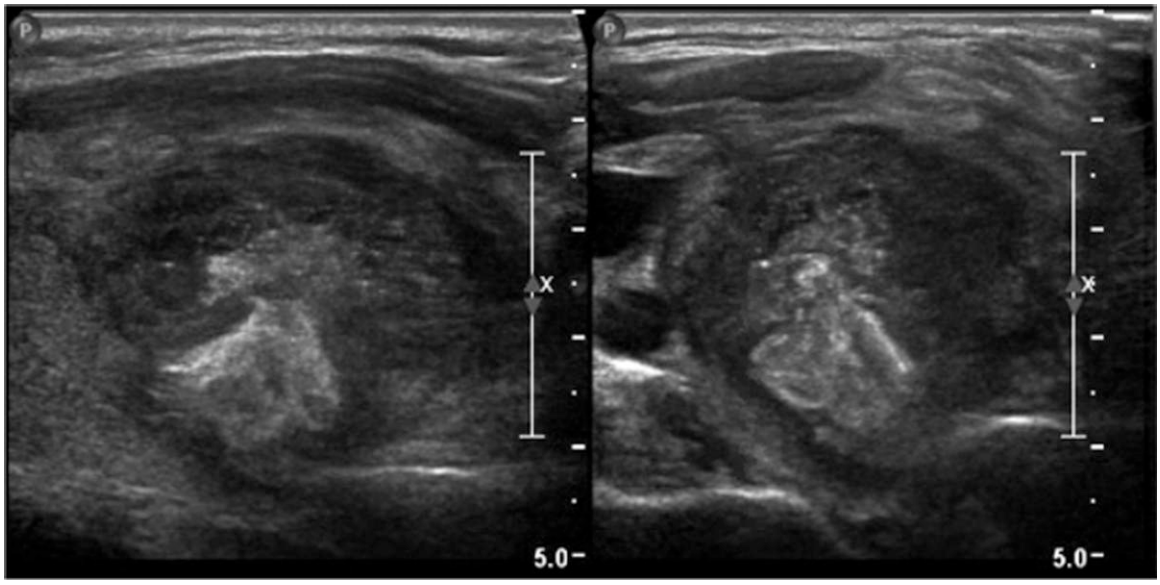

Figure 2. Post–fine-needle aspiration biopsy ultrasound of a right thyroid nodule performed May 11, 2021.

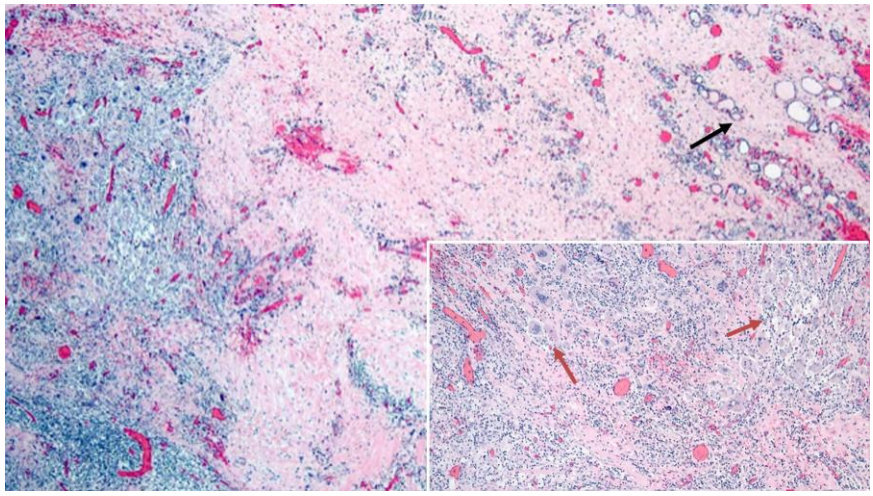

Figure 4. Marked chronic lymphohistiocytic inflammation (left) with fibrosis and residual thyroid follicles (black arrow) (hematoxylin and eosin stain, 4×). Inset highlights marked foreign-body giant cell reaction (red arrows) (hematoxylin and eosin stain, 20×).

injections, and accidental or iatrogenic means [4]. Irrespective of how the foreign body is introduced, the body's immune system responds by inducing the accumulation of neutrophils, and later, monocytes and local tissue macrophages that engulf (or attempt to engulf) the foreign material and become activated. A granuloma is formed around the offending agent if the foreign material cannot be broken down. On pathology, these foreign-body granulomas are characterized by the presence of epithelioid histiocytes (individual enlarged macrophages) and foreign-body giant cells (formed by the fusion of macrophages) associated with a variable number of lymphocytes. Sometimes, the foreign material can be identified in the center of the granuloma [4]. Clinically, a foreign-body reaction can result in an acute inflammatory response accompanied by symptoms of pain, swelling, and erythema at the site, with subsequent clinical resolution or progression to chronic inflammatory response and persistent symptoms. In most cases, the excision of symptomatic lesions containing the foreign body is the treatment of choice. Intralesional corticosteroids are also used in some cases [4].

To the best of our knowledge, this is the first report of an idiopathic foreign-body reaction after FNA of the thyroid. At her initial presentation, the differential diagnosis for our patient included acute infectious thyroiditis, subacute thyroiditis, and post-FNA thyroid hemorrhage. We expected a total resolution of her symptoms with the completion of her antibiotic course if they had been caused by an infection or subacute inflammatory process. The final diagnosis of foreign-body reaction was based entirely on the histology of her thyroid tissue. A case report by Bonsignore et al (2022) [5] described the case of a 78-year-old woman who experienced fatal thyroid hemorrhage after FNA for a thyroid nodule. In addition to the massive hematoma in the neck seen on autopsy, histology of the thyroid tissue showed a granulomatous process with foreign-body–type giant cells, reactive to colloid extravasation and microhemorrhages. In contrast to this, there was no evidence of gross or microhemorrhage in the thyroid tissue or other inciting etiology for the foreign-body reaction seen on histologic evaluation of the thyroid tissue from our patient. Additionally, the foreign-body reaction in our patient's thyroid tissue was focal to the area of the FNA and showed no extension to her perithyroidal tissues or adipose tissue, unlike the case reported by Bonsignore et al. Histology findings that would have suggested previous microhemorrhage within the thyroid tissue include the presence of hemosiderin deposits, cholesterol granulomas, and residual fibrin microthrombi in the thyroid vasculature [5]. There have been reports of post-thyroidectomy foreign-body reactions related to silk sutures used during surgery [6]. Because our patient reported her thyroid pain and inflammatory findings were seen after her FNAB procedure, we suspect that a foreign body was introduced during the procedure. As this procedure was not performed in our facility, we were able only to hypothesize possible sources. Notably, we suspect that an accidental introduction of ultrasound gel into the thyroid tissue occurred given that the procedure was likely performed only with a needle, lidocaine for local anesthesia, and the ultrasound machine. Though literature review did not reveal such complications after FNAB in other parts of the body, similar foreign-body reactions to hyaluronic acid, liquid paraffin, and silicone gel used for cosmetic procedures are known to occur [7–9]. An experimental study involving the introduction of ultrasound gel into the subarachnoid space of piglets led to an inflammatory response in the neuraxial space, which also supports the potential of ultrasound gel causing inflammation if introduced into organic tissues [10].

Learning Points

- FNAB remains a very safe procedure with few, manageable complications that promptly resolve.
- Our patient's case is a rare and unexpected complication that is unlikely to occur if the procedure is performed correctly by or under the supervision of experienced professionals.

Contributors

All authors made individual contributions to authorship: O.A. was involved in writing and submitting the manuscript; E.N.P. was involved in the diagnosis and management of this patient and supervised the writing of the manuscript; and S.C. was involved in the histopathology and preparation of histology images. All authors reviewed and approved the final draft.

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Informed Patient Consent for Publication

Signed informed consent was obtained directly from the patient.

Data Availability Statement

Data sharing is not applicable to this article as no data sets were generated or analyzed during the present study.

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